Three Essays on Multinational Firms

Chapter 1: Input Linkages and the Transmission of Shocks: Firm-Level Evidence from the 2011 Tōhoku Earthquake (*with Christoph Boehm and Nitya Pandalai Nayar*)

This paper provides causal evidence for the role of trade and multinational firm activity in the cross-country transmission of shocks. Using the 2011 earthquake/tsunami of Japan as a natural experiment, we evaluate the spillovers from the intermediate input linkages of multinational affiliates. The scope for these linkages to generate cross-country spillovers depends on the elasticity of substitution with respect to other inputs in the domestic economy. We use restricted use Census data with new links to international ownership structure to estimate this elasticity. To focus attention on the role of vertical linkages, we develop a new methodology for separating firm-level imports intended for further manufacture.

We find that those firms with large exposure to intermediate inputs from Japan – the U.S. affiliates of Japanese multinational firms – experience significant output declines in the months following the Tōhoku event. Output drops roughly one-for-one with imported inputs, consistent with a Leontief relationship between imported and domestic inputs. Structural estimates of the production function for these firms yield disaggregated production elasticities that are similarly low. For Japanese multinationals, the elasticity across material inputs is 0.2 and the elasticity of substitution between material inputs and a capital/labor aggregate is 0.03. For non-Japanese firms using inputs from Japan, the elasticity of substitution across material inputs is, unsurprisingly, somewhat higher at 0.6.

Such low elasticities imply the presence of spillovers to other upstream and downstream firms, a feature which can magnify the overall transmission of the shock. We point to natural characteristics of intra-firm trade as the source of these strong complementarities for multinational firms. Our results suggest that global supply chains are sufficiently rigid to play an important role in the cross-country transmission of shocks.

Chapter 2: The Role of Multinational Firms in Business Cycle Comovement (*with Christoph Boehm and Nitya Pandalai Nayar*)

This paper quantifies the role of vertical linkages by multinational firms in the high and growing degree of output co-movement among advanced economies. The median OECD country's correlation with U.S. GDP increased from 0.3 during 1980-1995 to 0.73 during the period 1995-2010, yet existing models have difficulty in generating significant endogenous co-movement in value-added. We show that multinational firms are a large and growing feature of the global economy, and account for a substantial share of overall trade, much of which involves intermediate inputs. On average, these imported inputs account for over 30 percent of the costs of a typical foreign affiliate operating in the United States.

We construct a simple two country model to quantify the aggregate effects of trade and multinational ownership linkages. A key feature of the model is a low elasticity of substitution be-

tween the cross-country inputs of multinational firms, consistent with estimates from Boehm, Flaaen, and Pandalai Nayar (2014). This model setup separates out this elasticity with the so-called "Armington elasticity" which measures substitutability across final goods. We find that these rigid supply chains can have a measurable impact in the aggregate. Value-added comovement increases by nearly 18 percentage points relative to a counterfactual scenario in which such multinational input linkages are absent. These complementarities also lead to much stronger comovement in export shipments between the countries, a level that is roughly consistent with the data.

Chapter 3: Multinational Firms in Context

This chapter studies the defining features of multinational firms in U.S. manufacturing in the context of their exporting and domestic-only counterparts. New links between Census Bureau microdata and directories of international corporate ownership provide a novel perspective on foreign multinational affiliates and the domestic operations of U.S.-based firms with affiliates abroad. I find that multinational firms are larger, more productive, more capital-intensive, and pay higher wages than either domestic or exporting firms. The magnitude of this "multinational premia" is consistently 3-4 times that of the so-called "exporter premia" documented in previous research. Although 70 percent of multinational firms exhibit positive levels of exports, the share of sales destined for outside the U.S. is small — only 10 percent.

Ownership patterns have a large effect on trade flows. Roughly 45 percent of the imports to a foreign multinational affiliate in the U.S. originate from the country of the parent company. While substantial vertical trade linkages is consistent with foreign operations seeking to access factors of production (vertical FDI), the focus on domestic sales in the U.S. aligns with foreign operations that serve to lower costs of market access (horizontal FDI). The paper concludes by discussing the implications of such a "horizontal FDI with production sharing" framework of multinational firm behavior.